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THESIS

A SURVEY OF AIRPORT MANAGEMENT POLICIES IN MASSACHUSETTS

By

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(B.A. University of Virginia 1942)

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for the degree of

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INTRODUCTION

Aviation is today in a stage of transition. It is still an infant industry and, is suffering all the pangs of growth, technical change, varying public support, keen competition, management problems, and even labor problems. In brief, aviation is becoming "big business" and it is doing so almost over night.

As many and as varied as the problems of the airlines and the major terminal airports from which they operate, are the problems of the small or community airport. These airports range in size from the large government built military fields recently turned over to the communities in which they are located; to the small landing "strips" often referred to as "cow pasture" fields. They are variously called "airports", "airparks", "aviation country clubs", "country clubs of the air", and town or municipal airports. No matter what name they are given, one fact remains, without them, the private or small commercial airplane would be as useless as the automobile would be without modern highways with their service stations and repair shops.

At the present time, exhaustive studies and surveys are being made in an effort to reduce the hazards to air transportation, and the vast problems to management presented by the terminal airports. Despite the large number of transport crashes reported so vividly in our national press, the statistical record of the airlines tells a different story, one of increasing safety in air travel. This statement is backed up by the recent reduction in rates granted the airlines by the insurance companies. Management problems are being overcome by the application of management techniques employed by successful organizations in other in-

dustries. One of the techniques is the elimination of costly duplication of effort. The near future should bring about efficient, well coordinated, major terminal airports. Each will be operated as a single corporate enterprise, and will no longer give the appearance of being merely a collection of individuals whose only claim to concentrated action lies in the fact that they operate at the same field and generally under the same roof.

"By this time, it is trite to point out that the potentials of the private flying industry are far greater than those of scheduled air transport. To put it briefly, while one thousand persons a day are flying across the Atlantic, someday in the future one hundred thousand will be flying hither and yon about this country in their own planes. Private airplane owners will buy many times as much hanger space, repair service, and fuel as that used by all the airlines combined. However, as with any other form of transportation, private flying volumne will be determined by the safety of the airplane and its utility.(1)

The air itself is limitless. Highways offer no problems to the pilot. However, the utility of an airplane has one serious limitation. An airplane must have a place to fly from and a place to land.(2) Concurrent with the obvious necessity for physical existence of airports, is the doctrine upon which the success of any enterprise depends, efficient management.

It is the aim of this thesis to present a survey of airport

(1) Theodore P. Wright - "Private Flying and Airports", *The Aviation Annual of 1946*, p. 133.

(2) Esso Inc. - *Community Airports and Airparks*, January 1945, p. 6.

management policies as they exist in Massachusetts, the conclusions reached by the author, and constructive suggestions made by a number of authorities concerning airport management. Because of the basic differences between terminal-type airports serving airline transportation needs and the smaller airport serving the commercial transient, the non-schedule airline and the private pilot; and because of the excellent study recently made of the terminal-type airport;(1) this thesis is limited to the management policies of the second, or smaller airport. As presented, it is divided into seven parts.

Chapter 1 is concerned with the type of business organization available to airport management; those which are at present in use, and a consideration or evaluation of the advantages and disadvantages of each type; and a breakdown and analysis of personnel requirements.

Chapter 2 deals with the analysis of airport capital investment.

Chapter 3 analyses existing airport income as to source, and presents in tabular form the charges now made to customers for various types of service.

Chapter 4 examines the existing and potential controls both financial and operational.

Chapter 5 presents a discussion of airports facilities.

Chapter 6 is concerned with the airport and its role as a community center, and its relation with municipal officials, approaching the problems from the point of view of public acceptance, official cooperation and zoning.

(1) Bollinger, Passen, and McElfreth - Terminal Airport Financing and Management.

Chapter 7 presents the summary and conclusions drawn from the preceeding chapters.

In order to obtain sufficient material concerning airport management to permit this survey, twenty selected airports in Massachusetts were visited and carefully studied by the author. The various tables presented are drawn from the data so obtained. Because of the fallibility of questionaires experienced by other investigators, this approach was discarded at the onset, and a direct, first-hand investigation was made. Together with the data so obtained by field work, considerable information was obtained from the views, opinions, and knowledge of numerous authors in the field of aviation as expressed in their various writings. Discussions with airport managers, owners, and operators, and men in numerous activities directly, and indirectly, connected with airports proved to be an invaluable source of information. In this way, a definite effort was made to obtain and evaluate the conflicting views of interested parties on both sides of controversial issues.

The twenty airports comprising the selected sample presented in Table 1, fall most logically into two main divisions; those which are privately owned and operated, and those which are municipally owned with private operators functioning on a lease basis. Here, a discrepancy may appear to exist between the latter class and the scope of this thesis. However, with the two exceptions of actual ownership of the land and the responsibility for maintenance of the landing area, the problems of management are very nearly the same for owner operators, and operators on municipal airports.

Further examination of Column 1, Table 1, shows that nine out of

TABLE 1: CLASSIFICATION OF TWENTY SELECTED
MASSACHUSETTS AIRPORTS
January 30, 1947
(By Civil Aeronautics Administration
designation, and ownership.)

Airport	CAA Classification Col. 1 (1)	Ownership of Airport Col. 2	Condition of Field Col. 3			
			Altitude in feet above sea level	Lighting (2)	Surface (3)	Length of Runway in hundreds of feet
Section 1						
A	Class 1	Private	120	None	S	20
B	"	"	128	"	S	15
D	"	"	25	"	S	15
F	"	"	110	"	E	20
L	"	"	40	"	S	18
M	"	"	100	"	S	20
Q	"	"	120	"	S	17
S	"	"	98	"	S	15
T	"	"	20	"	S	30
C	Class 2	"	45	"	S	25
G	"	"	18	"	H	21
P	"	"	15	"	S	25
Section 2						
H	Class 3	Municipal	80	L	H	50
I	"	"	80	L	H	50
J	"	"	56	L	H	41
K	"	"	47	None	H	40
O	"	"	68	"	H	38
R	"	"	160	L	H	40
N	"	"	50	L	H	40
E	Class 4	"	128	L	H	50

(1) Class of airport, Civil Aeronautics Designation.
Class 1, - Length of runway 1800 to 2500 ft.
" 2, - " " " 2500 to 3500 ft.
" 3, - " " " 3500 to 4500 ft.
" 4, - " " " 4500 to 5500 ft.

(2) Lights - "L" indicates minimum CAA lighting facility requirements.

(3) Surface - "H" -hard surface.
"C" -cinders.
"S" -sod or gravel.

the twelve airports which are privately owned and operated are designated by the Civil Aeronautics Administration as Class 1 landing fields, (1) while the remaining three airports are officially Class 2. Looking still at the first section, Table 1, Column 4 shows that in no case do the airports meet the C.A.A. minimum lighting facility requirements, that only two fields are hard surfaced, i.e., paved, and that the average length of longest runway is very close to two thousand feet. Columns 2 and 3 of section one are self-explanatory since all the airports in this section are privately owned and in no case are they used by either scheduled or non-scheduled airlines.

Section 2, Column 1, of Table 1 shows that seven out of eight of the airports are C.A.A. Class 3 while one is Class 4. Column 4 indicates that all are hard surfaced, that six of the eight meet the C.A.A. minimum lighting facility requirements, or better, and that the average length of longest runway is four thousand four hundred feet. This considerable difference in size, surface, and lighting facilities, between the airports in sections one and two of Table 1 may be attributed, with only two exceptions, to the fact that these airports are Army and Navy surplus fields turned over at the end of the war to the municipality in which they are located. In only two cases, in the opinion of this author, is the present size of the airport warranted by either size of population served, or volume of present commercial and private traffic. These airports would not, in all probability, have been enlarged to their present size for any reason other than national defense.(2)

(1) See footnote 1, Table 1.

(2) Bollinger, Passen, and McElfresh, Terminal Airport Financing and Management

Since the airports included in this survey are all located in Massachusetts, certain facts and incidents concerning this state's aeronautical history are of interest.

Previous to the American revolution, a doctor named Jeffries made his home on that section of the Massachusetts coast now known as East Boston. The particular point of land upon which he lived became known as "Jeffries' Point". When the revolution broke out, Jeffries, a Tory, was forced to flee to England. This much is common knowledge. However, few people realize that this Jeffries and the Jeffries, who a few years later crossed the English Channel in a baloon, were one and the same man. An interesting coincidence may be noted therefore, when, in 1922, "Jeffries' Point" was selected as the site of the first landing strip of what is now the Logan International Airport.(1)

Of additional historical interest is the fact that this airport at East Boston is credited with the origin of the word "airport".(2) Before this date, landing facilities for aircraft had been called "aerodromes", flying fields", etc., but never before had the word "airport" been used.

The first flying field to be constructed in Massachusetts was built at Squantum in 1911. It was here that a vew years later the first airmeet in the United States was held. Today, this land, the site of the first airfield in the state, is the approximate location of the important Squantum Naval Air Station.(3)

(1) Interview March 27, 1947, with Mr. Arthur Tully, Former director State Aeronautics Commission.
(2) Interview March 26, 1947, with Mr. Crocker Snow, Present director State Aeronautics Commission.
(3) Interview March 27, 1947, with Mr. Arthur Tully.

After World War I, most early developement in Massachusetts airfields was centered around Boston. The first civil airfield to be constructed here was located in the township of Weston. This was closely followed by the establishment of the State Muster Field in Framingham.(1)

The first airline to operate in New England was the "Colonial Air Transport" which began its activity at the East Boston Airport in April 1927. This airline was the immediate predecessor of the now vast "American Airlines" system.(2)

In regard to military activity, it may be noted that the "Boles Agawam Airport" was the destination in 1930 of one of the earliest Army Airforce mass concentrations. Nearly the entire United States Airforce of that year was present in this maneuver.

A Massachusetts railroad is responsible for another aviation "first". The Boston and Maine Railroad was the first United States railroad to enter the field of air-transport. As part owner of the "Boston and Maine Airways", this railroad was until recently an active participant in the aviation business.

Massachusetts, although by no means the birthplace of aviation, did play an interesting and important part in its early history in this country. At the present time, Massachusetts stands first among the states in number of airports per square mile, having a total of seventy recognized airports and seaplane bases. It ranks thirty-eighth, however, in number of airports per capita.

---

(1) Interview March 27, 1947, with Mr. Arthur Tully.
(2) Interview, March 26, 1947, with Mr. Crocker Snow.

The following table shows the number of airports in Massachusetts, excluding seaplane bases, reported by the Civil Aeronautics Administration from the years 1935 to 1946.

TABLE 2: NUMBER OF AIRPORTS IN MASSACHUSETTS

Year	Airports
1935	44
1936	42
1937	40
1938	36
1939	41
1940	39
1941	40
1942	41
1943	47
1944	53
1945	43
1946	58

source: Air Market Data Service, Air Review Publishers Corp.
Dallas, Texas. Southern Flight and Modern Airports

CHAPTER I

BUSINESS ORGANIZATION AND PERSONNEL

The first step in the organization of an airport, as in any other type of business, is the selection of the form of ownership to be used. The advantages and disadvantages of the sole proprietorship, the partnership, and the corporation, should be taken into consideration and weighed carefully before a decision is made.

Summarizing briefly these advantages and disadvantages it may be said that: (1) The sole proprietorship permits freedom of initiative, opportunity for close supervision, and a minimum of "red tape". However, the availability of capital is limited to the resources of the individual airport operator and he is by law responsible personally for all liabilities incurred. (2)The partnership is also unrestricted in its activity; it is easy to form and may readily serve as a means of bringing more capital and increased technical knowledge and skill into the airport management. As in the case of the sole proprietorship, the partnership is not a legal entity and therefore the partners may be held personally liable in event of failure or an unfavorable court action. (3)The corporation, as a legal entity, offers limited liability, an element of permanency, ease of transfer of ownership, and, since a large number of persons can participate, it greatly increases the availability of capital. Greater organizational costs are entailed, however, and corporations are subject to restrictions imposed by State and Federal Governments, higher taxation and generally more complex bureaucratic procedures.

CHAPTER [illegible]

BUSINESS ORGANIZATION OF AN AIRPORT

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TABLE 3: TYPES OF BUSINESS ORGANIZATION
TWENTY SELECTED AIRPORTS IN MASSACHUSETTS
January 30, 1947

Airport	Type of Business Organization
Section 1	
Owner Operators	
A.	Corporation
B.	"
D.	"
F.	"
G.	"
P.	"
S.	"
T.	"
C.	Partnership
Q.	"
L.	Sole Proprietorship
M.	"
Section 2	
Municipal Operators	
E.	Corporation
H.	"
I.	"
J.	"
K.	"
O.	"
N.	"
R.	Partnership

Table 3 shows the representation of these three forms of ownership among the twenty Massachusetts airports chosen as a sample for this survey. The preponderance fifteen out of twenty have incorporated; the remainder consists of two sole proprietorships and three partnerships.

In both instances of sole proprietorship, the scope of operations is relatively small and the airport managers expressed the belief that any advantages of the corporate form would be overshadowed by the additional expense and paper work that would be incurred by incorporating.

Of the three airports organized as partnerships, two utilize this form primarily because of its unrestricted nature. In each case the operation of the airport is only one component part of the activity carried on under the partnership agreement. The third example of this type is a "family" enterprise, and the motivating force here is a desire to retain control in the hands of its members.

The prevelence of the corporate form of ownership as evidential by Table 3, is due primarily to two factors which are peculiar to the operation of an airport.(1) The first is the relatively large capital investment required,(2) as compared with other businesses of a similar size; and second, the inordinate liability brought about by the rather hazardous nature of flying activities.

---

(1) Interview, March 23, 1947, with Mr. Putnam Lee, Aviation, Research Assistant, Harvard Business School.

(2) See Table 5, Chapt. 2.

Airport Personnel

The presence of efficient, dependable and courteous service at an airport is without doubt the single most important factor of good management.(1) It is this aspect of an airport rather than mere physical facilities and size that turn the chance visitor into a regular customer. Word of mouth advertising is an extremely potent media which can make or break an airport in the eyes of the flying public, and can do so in a very short time.(2)

The key to efficient service lies in the individuals who constitute the airport personnel. It is this group of people, from the top management down the line, which must function as a team and create and maintain the airport's reputation for service.

Since airport employees are of necessity highly skilled, the airport payroll is a major item of expense. Consequently, a high degree of efficiency of personnel must be developed by employees if financial solvency is to be maintained. Proper selections, training, and supervision as compared with haphazard functioning is, therefore, a "must" with an airport as it is with any other successful enterprise.

Table 4: presenting the number and distribution of personnel at the twenty airports in Massachusetts, which were selected as a sample, shows the existence of a wide range both within and between classes of personnel and in total numbers of persons employed at similar airports. Essentially, this range is due to differences in individual management

(1) Strohmeier, W. D., "Service and Paint Brush Bring and Hold New Business", *Aviation* 48; 1945 D'44.

(2) Interview September 2, 1947 with the manager of the Hyannis Airport, Hyannis Massachusetts.

TABLE 4: DISTRIBUTION OF PERSONNEL

TWENTY SELECTED AIRPORTS IN MASSACHUSETTS

January 30, 1947

Airport	Executives Col.1	Clerical Col.2	Line Col.3	Airplane and Engine Shops Col.4	Pilots and Instructors Col.5	Janitor or Watchman Col.6	Total Col.7
Section 1							
A	2	2	1	2	4	0	11
B	3	2	1	5	5	0	16
C	3	1	1 FT 1 PT	2	3 FT 1 PT	0	12
D	1	1	2 S	2	4	0	10
F	4	3	3	6	5	1	22
G	2	7	5	9	8	1	32
L	1	1	0	0	2	0	4
M	1	1	1	0	3	0	6
P	3	1	1 PT	4	2	0	11
Q	3	1	2	6	4	1	17
S	2	1	2	1	2	0	8
T	1	1	1	0	2	0	5
Low	1	1	0	0	2	0	4
High	4	7	5	9	8	1	32
Average	2	1	2	3	4	0	15
Section 2							
E	3	3	2	5	6	0	19
H	4	3	1	3	5	0	16
I	5	5	5	10	5	1	31
J	2	1	1 T	1	2	1 T	8
K	2	1	1	1	2	0	7
O	2	1	1	2	2	0	8
R	2	2	*Mech	3	8	1	16
N	4	4	8	Sub.** Corp.	26	2	44
Low	2	1	1	1	2	0	7
High	5	5	8	10	26	2	44
Average	3	2	2	3	5	1	16

FT-- Full Time
PT-- Part Time
S -- Summer Only
T -- Employed by the municipality, not the operator.
* -- Mechanics double as linemen
**-- A subsidiary corporation

policy as well as variations in the volume of business. Considering top management first, Column 1, Table 4, substantiates the premise suggested by the Civil Aeronautic Administration (1) that there should be at least two responsible executives at an airport, a manager and an assistant manager capable of assuming full responsibility in the absence of the manager. The range in this class in Section 1 of the table, i.e. owner operators, is from one to four or an average of two. In Section 2, i.e. municipal operators, the range is from two to five, the average being slightly higher, or three, corresponding to the increase in size of operations of the airports in this section as against those in Section 1.

Column 2, Section 1, Table 4, shows that in general one clerk in sufficient to handle the "paper work" for the owner operator class airport. The exceptions arising from the large amount of bookkeeping involved in the G.I. training program, and being a temporary expediency. Again, Section 2 shows a proportionately greater number in this class of employee.

As portrayed in Columns 3, 4, and 5, Table 4, the range in number of linemen, mechanics, and pilots is noticeably greater than warranted by solely variations in volume of business and size of physical layout. Here is where the opinions of management as expressed during the survey, vary considerably. Certain managers do not believe that expense of additional employees is warranted in terms of an increase in volume of business brought in by more efficient service. Others believe that it is only

(1) U.S. Department of Commerce, Civil Aeronautics Administration, Airport Management, p. 3.

through creation of a reputation for "super service" that their business can build up volume and prepare for a future no longer subsidized by a G.I. training program paid for by the U.S. Government. Consequently, they hire more men to give this all important service, sustaining the present high costs with an eye to the future.

The following two personnel set-ups have been suggested for airport management. Type 1 is for the small airport, while Type 2 is more applicable to the larger class of operations.(1)

Type I:

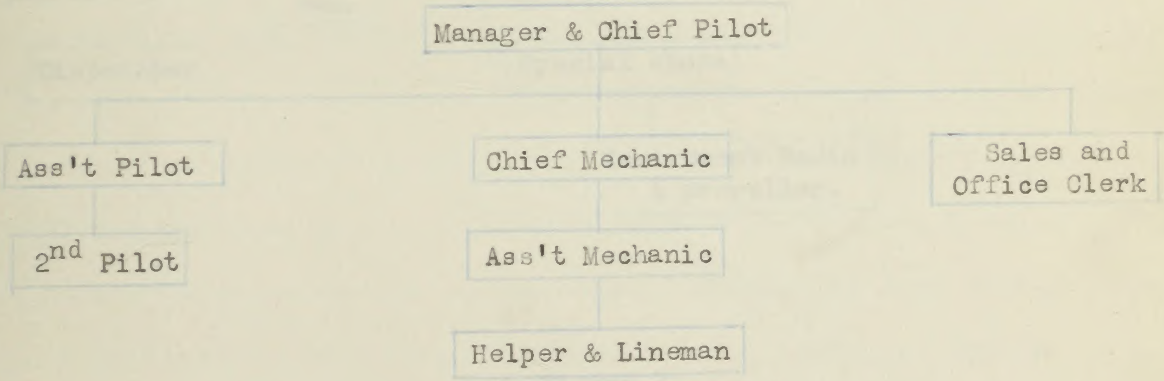
Manager & Chief Pilot
Ass't Pilot
2nd Pilot
Chief Mechanic
Ass't Mechanic
Helper & Lineman
Sales and Office Clerk

Figure. 1

---

(1) Parker, C. A., "System Saves $$ at the Airport", Aviation, Mar.'46, p. 46-49.

Type 2:

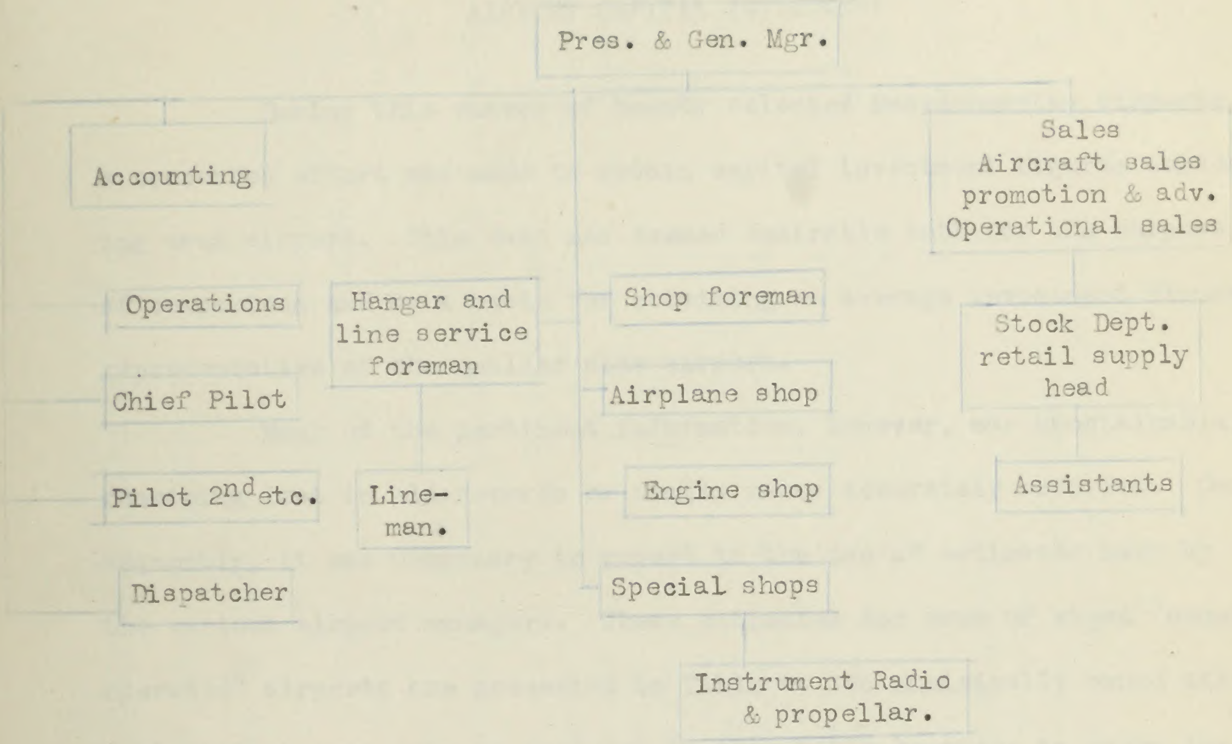
Pres. & Gen. Mgr.
Accounting
Sales
Aircraft sales
promotion & adv.
Operational sales
Operations
Hangar and line service foreman
Shop foreman
Stock Dept. retail supply head
Chief Pilot
Airplane shop
Pilot 2nd etc.
Line-man.
Engine shop
Assistants
Dispatcher
Special shops
Instrument Radio & propellar.

Figure 2.

CHAPTER 2

AIRPORT CAPITAL INVESTMENT

During this survey of twenty selected Massachusetts airports, a concerted effort was made to obtain capital investment figures concerning each airport. This data was deemed desirable both for the purpose of comparison and as a basis for obtaining an average investment figure representative of the smaller size airport.

Much of the pertinent information, however, was unobtainable, remaining lost in old records or simply never accurately recorded. Consequently, it was necessary to resort to the use of estimates made by the various airport managers. These estimates for each of eight "owner operated" airports are presented in Table 4. No municipally owned airport capital cost data is included in this table because, in every instance encountered in this survey, these airports are Army or Navy surplus bases, their extensive developement being due to the demands of national defense, which makes any figures obtained of little relative value. In addition to the distortions introduced by construction for military purposes, a serious effect of government financing has been the inflation of construction costs on nearly all facilities.(1) For example, at one surplus airport in the survey, a government built hangar is assessed at seventy-five thousand dollars. Actually, this structure could be replaced, even at today's high prices, for approximately twenty thousand dollars.

---

(1) Bollinger, Passen and McElfresh, Terminal Airport Financing and Management, p. 103.

CHAPTER V

AIRPORT CAPITAL INVESTMENT

During this survey of twenty selected Massachusetts airports, a concerted effort was made to obtain capital investment figures concerning each airport. This data was deemed desirable both for the purpose of comparison and as a basis for obtaining an average investment figure representative of the smaller size airport.

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---

(1) Bollinger, Passen and McElfresh, *Terminal Airport Financing and Management*, p. 110.

TABLE 5: DISTRIBUTION OF CAPITAL INVESTMENT (1)

AT EIGHT SELECTED MASSACHUSETTS AIRPORTS

January 30, 1947

Air-port	Landing Area Col. 1		Administration Building Col. 2		Hangar Buildings Col. 3		Miscellaneous (2) Col. 4		Total Investments Col. 5	
	Amount	% of Total	Amount	% of Total	Amount	% of Total	Amount	% of Total	Amount	%
A	(Leased)		(Leased)		$7,000	14.	$43,000	86.	$50,000	100
B	$75,000	47.	$3,500	2.	50,000	31.	31,500	20.	160,000	100
D	40,000	47.	8,500	10.	15,000	18.	21,700	25.	85,250	100
F	66,000	53.	8,500	7.	40,000	32.	11,500	8.	125,000	100
G	140,000	56.	25,000	10.	56,000	22.	29,000	12.	250,000	100
L	(Leased)		1,200	8.	2,500	17.	11,300	75.	15,000	100
M	(Leased)		1,200	15.	2,500	31.	4,100	54.	8,000	100
S	12,000	45.	5,000	18.	5,000	18.	5,000	19.	27,000	100
Low	$ 8,000	45.	$1,200	2.	$2,500	14.	$ 4,100	8.	$ 8,000	100
High	140,000	56.	25,000	18.	56,000	32.	43,000	86.	250,000	100
Average	---	49.6	---	10.0	---	23.	---	(4)	---	

(1) Figures are estimated by Airport Managers
(2) Includes owned aircraft in some cases.
(3) This is the lowest estimated value of leased land.
(4) Extreme items here destroy the value of any computed average.

Although part of the extreme range shown in the columns of Table 4 may be explained by variations in size of facilities and extent of operations, this is not the full story. Airport construction is marked by the extreme range both as to amount and cost of developement necessary. Varying physical conditions of locations, fluctuations of unit prices, and size affect the initial and total capital expenditure. For example, in certain sections of this country, nature has practically provided ready-made landing fields where little or no improvement is necessary before flying activity may begin. In other sections, particularly in New England, the reverse is true and the adaptation of natural land to aviation use is an extremely costly and difficult job entailing extensive clearing and grading. These costs, incurred in site improvement, not only vary widely between different sections of the country but also between airports located close together in the same section. Therefore, it is very difficult to compare the capital investment figures, as such, of different airports even where both physical size and extent of operating facilities appear to be similar.

In an effort to remove the variations due to location, and to establish a basis for comparison, the capital cost figures in Table 5, have also been translated into percentages of total capital investment. Percentage-wise a close simularity is seen to exist within each of the component parts of total capital investment.

The range in landing area costs, (excluding the cases where this item is leased), as a percent of total, is very narrow, from forty-five to fifty-six, or a spread of only eleven percent. Although the dollar cost varied from eight to one hundred and fourty thousand dollars,

in each case the actual figure averaged forty-nine plus percent of the total individual airport costs.

Column 2, Table 5, shows that an average of ten percent of total expenditure was charged against the administration building. The range being from two to eighteen percent. Here, conditions of location have little affect. The wide variation in actual expenditure is due primarily to the requirements of different scale operations.

Column 3, listing the capital investment in hangars and corresponding percentage of total that each represents, again discloses a relatively narrow range with an average of twenty-three percent.

The figures in Column 4, representing capital invested in miscellaneous equipment, operational airplanes and airplanes for sale, and many other items, vary widely with the magnitude and scope of operations. Consequently, there exists a broad range among the items when taken as a percent of total investment. The extreme cases, particularly where there has been no capital expenditure for land (three cases) or administration building,(one case) prevent computation of any useful average.

As indicated earlier in this chapter, and from the analysis of the data presented in Table 5, it is impossible to select a representative, average figure for either total airport capital investment or for any of the component parts of this total. Too many variables exist and it cannot be said that, "other things being equal", it would take so much capital to construct and commence operations on an airport of a specific size.

However, looking again at Table 5, it is possible to draw certain general conclusions when considering a break down of total capital

investment on a percentage basis. The average expenditure on land and site improvement constituted approximately fifty percent of total investment. The administration or terminal building accounted for ten percent and the hangars for twenty-three percent of the total cost figure taken as equal to one hundred percent.

CHAPTER 3

AIRPORT INCOME

As stated in the introduction to this thesis, it is the purpose of this chapter to examine and analyse existing airport income as to source, and present in tabular form the charges to customers for the various types of service as made be the twenty airports in Massachusetts selected as a sample.

There are essentially three major sources of airport income: flight operations; sales and service; and concessions. To obtain a clear picture, each of these major classifications must be broken down into its component parts and each part analysed both separately and with regard to its relationship to total income.

The first major source, flight operations maybe subdivided into three parts: income from instructions; income from recreational flying; and income from charter operations. From Column 1, Table 6, it may be seen that flight instruction, including both instruction under the G.I. program and private instruction, constitutes a very high percentage of the source of both income from flight operations and total income, with a range of from twenty to ninety-nine percent. It is the concensus of opinion(1) that this percentage is unduly high, its inflation having been caused mainly by the institution of the G.I. training program and the rush of airport operators to take advantage of this exceptionally easy source of income. Immediate postwar thinking predicted an enormous in-

(1) Interviews, January 29, 1947, to March 10, 1947, with twenty airport managers.

TABLE 6: GROSS INCOME ANALYSIS

FIFTEEN SELECTED AIRPORTS IN MASSACHUSETTS

January 30, 1947

(by percent of total)*

Airport	Flight Operations				Sales and Service
	Instruction Col. 1	Recreational Col. 2	Charter Col. 3	Total Col.4	Col. 5
A	90	2	2	94	6
B	80	5	0	85	15
C	80	10	3	93	7
D	70	15	15	100	0
F	90	0	0	90	10
G	60	5	5	70	30
L	85	10	0	95	5
M	35	20	21	76	24
P	90	2	0	92	8
S	90	0	0	90	10
E	80	5	0	85	15
H	90	5	0	95	5
I	20	10	0	30	70
J	48	15	17	80	20
R	99	0	0	99	1
Low	20	0		70	0
High	99	20		100	70
Average[o]	79.4			88.5	16

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* From actual airport records when available--where no records where available, from airport managers estimate.

o Average computed disregarding extreme items.

crease in private flying. As this has failed to materialize at the speed or volume hoped for, it is to the G.I. training program that the individual airport operator has turned. It is not an over-statement that, in many cases, this G.I. program is all that stands between the airport and financial insolvency.

Recreational flying, the second subdivision of flight operations, consists of sightseeing rides sold to the general public at an average of two dollars for ten minutes, rentals of aircraft to private pilots, and the operation of flying clubs. At present, recreational flying is a relatively minor source of income. As shown in Table 6, Column 2, this source has, in only one instance, exceeded fifteen percent of total. However, airport operators are looking forward to considerable expansion in both rentals to private pilots, as is evidenced by the recent establishment of several "U-Fly-It" services; and in flying club activities, designed to reduce costs to individuals on a basis of volume. Flying clubs are an excellent means of maintaining interest among former students of G.I. programs and thereby building future customer volume.

Charter activity is the third subdivision of flight operations. Looking again at Table 6, a very wide range is noted in Column 3. Nine of the fifteen activities from whom figures were available reported no charter flying as such, while three of the six, having charter operations, credited them with from fifteen to twenty percent of total income. The wide dispersion here is due primarily to demands of location. Some airports are so geographically located as to afford better, and sometimes the only, means of transportation to neighboring areas and the main centers of transportation.

The second major source of airport income is the composite activities grouped together under the general heading of sales and service. Included under this heading are: the sale of aircraft, parts and accessories; rental fees from hangars and terminal building space; tie-down and courtesy charges; revenue from airplane, engine, and specialty repair shops; and income from the sale of gasoline and oil. Individually, no one of these activities is at present a very large income producer. However, collectively, as may be seen in Column 5 of Table 6, Sales and Service account for an average of fifteen percent of total income. Again a wide range is encountered, from zero to as high as seventy percent. The lack of consistency is due to variations in management policy. Some operators believe that herein lies the future major source of income and are aiming their management policy in this direction. Others appear to consider only a short run policy, stating that, as the need grows, they will expand these services to meet it.

The various types of hangars and their individual costs and merits are discussed in detail in a later chapter. As a source of income, hangar rentals,(i.e. the revenue from the storage of customer owned aircraft,) are consistent but limited: consistent in that the demand often exceeds the supply of available space; limited both by the high initial capital investment(1) required by extensive large hangar construction and a low rate of return necessary to attract business. Examination of Columns 1 and 2 of Table 7 shows high uniformity in charges made by the sample airports for over night storage but considerable variation in

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(1) See Table 5:

TABLE 7: SERVICE CHARGES

TWENTY SELECTED AIRPORTS IN MASSACHUSETTS

January 30, 1947

(In Dollars)

Airport	Hangar Storage Rates		Tie-Down Rates		Landing Fee	Remarks
	Per Night Col. 1	Per Month Col. 2	Per Night Col. 3	Per Month Col. 4	Per Landing Col. 5	
A	--	16.00	-- None --		--	$4.00 Monthly Service Charge
B	1.00	20.00	.75	No Discount	--	
C	1.00	16. and up	None	6-10.00	--	
D	1.00	15.00	.50	5.00	--	
F	1.00	20.00	1.00	10.00	--	
G	1.50	25.00	$\frac{1}{2}$ Hangar Charge		Com. Trans.*	$.50 Courtesy Parking Charge
L	1.00	20.00	1.00	20.00	--	
M	1.00	25.00	.50	10.00	--	
P	1.50	15.00	1.00	No Discount	--	
Q	1.00-1.50	15.00-20.00	-- None --		--	
S	--	20.00	None	8.00	--	
T	--	--	.75	No Discount	--	No Hangar Rentals
E	1-3.00	25-65.00	.50-1.00	10-20.00	Airlines & Com. Trans	See Appendix A For Complete Sched.
H	1-5.00	25-45.00	.50	No Discount	Com. Trans $5	
I	2.00	25-35.00	1.00	No Discount	Com. Trans $5	
J	1-3.00	25-65.00	.50-1.00	10-20.00	Com. Trans	See Appendix B For Complete Sched.
U	1.50-3.50	18-50.00	.75-3.00	9-15.00	--	
V	1.50-5.00	20-70.00	.75-3.00	9-25.00	--	
R	--	--	-- None --		Com. Trans $2	No Hangar Rentals
N	1.50-5.00	20-70.00	.75-3.00	9-25.00	--	

rates computed on a monthly basis. In the latter case, it appears to be the practice to charge "what the traffic will bear". Naturally the rates vary in accordance with the size of the airplane. Unnaturally, in some cases, rates were found to vary with the customer---- a discriminatory practice contrary to law.

A second source of income under the general heading of sales and service is the tie-down(1) charge. Here, a nightly or monthly fee is received in return for physically secured and supervised parking of airplanes. Twenty percent of the operators as evidenced by Column 3, Table 7, do not make such a charge. They believe that this service more than repays its cost in increased goodwill and the resulting purchases of other goods and services. Charges made by the remaining eighty percent of the operators range from fifty cents to a dollar (for light airplanes) as an over night charge, and from five to twenty dollars on a monthly basis.

In connection with the tie-down charge, certain operators of the group taken as a sample, are contemplating, and one has put into effect, a "courtesy charge". That is to say, a charge for parking during the day if the airplane is to be left for more than a specified number of hours. Justification of this charge is made on the grounds of added responsibility to the operator, crowded conditions at airports located near recreational centers, and the attendent service required in parking and "prop" spinning. Other operators feel that such a charge would be detrimental, tending to drive business away and consequently decreasing total revenue.

(1) Open air storage as compared with storage in a hangar.

Revenue from terminal building space rentals is another minor source of income. It is non-existant at all but four of the airports included in this survey since such revenue depends almost exclusively on the presence of scheduled airline operations using the particular airport as a terminal stop.

In the case of the terminal building, rental rates should return to the owner the total annual expense, (which includes an in-lieu-of-tax charge, interest on capital investment, and depreciation) plus a profit.---"The objective here should be to set rates which will produce maximmum revenues, consistent with the maintenance of good service."(1)

Sample terminal building rental charges for limited stop airports such as the four having airline activity included in this survey, are listed in Table 8.(2)

Revenue from airplane, engine, and specialty, repair shops is again dependent upon volume of business and the decision of management as to the capacity of this service to be established and maintained. Over-head is high since shop facilities must include adequate hangar space, expensive equipment, and highly skilled foremen and mechanics. The size of these facilities encountered in the sample Massachusetts airports surveyed, (as is shown by the number of shop employees listed in Column 4 of Table 4, Chapter 1,) varies from non-existence to extensive operations requiring the establishment of a subsidiary corporation with from fifty to a hundred employees. As a percent of total, revenue from repair shops varies in proportion to their size and capacity. The margin

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(1) Bollinger, Passen, and McElfresh, Terminal Airport Financing and Management, p. 178.

(2) Ibid., p. 327.

of profit is narrow and considerable volume must be maintained if any sizable contribution is to be made to total income.

TABLE 8: PREVAILING TERMINAL BUILDING SPACE CHARGES.(1)

LIMITED STOP AIRPORTS IN U.S.

1943-1945

Airport(2)	Basis of Charge	Rate per square foot per year* (Airline office and counter space)
A	Monthly rent	$ 1.54
B	"	2.00
C	"	4.50
D	"	2.63
E	"	12.00#
F	"	2.22
G	Square feet	1.50
H	"	1.50
J	"	1.80
K	"	2.00
L	"	2.00
M	Monthly rent	.69**

* Where basis of charge is a flat rental the per square foot rate has been calculated.

# Covers office space and landing fees for six schedules per day.

** No charge for ticket counter space.

Percent of total income constituted by the sale of fuel and by the sale of airplanes, parts and accessories is also dependent upon the

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(1) Bollinger, Passen, and McElfresh, Terminal Airport Financing and Management, p. 327.

(2) These are not the same airports as those covered by this survey.

ability of management to attract and to "sell" customers. In turn, this ability of management depends upon the efficiency of facilities and employees both, "on the line", and in the office as salesmen. Maintaining this compound source of total income is,therefore, as much a problem of personnel as efficient facilities.

Recently, concessions such as restaurants and "snack" bars, have become an additional source of income to the airport. This income results from a percentage of gross income paid to the airport by the concessionee. Flat rate rentals on concessions have proved to be unsatisfactory both to the concessioner and the concessionee. When volume of business is low, a flat rate may be unfair to the concessionee. When concession business volume is higher, under a flat rate system, the airport is the loser. A good example of the latter situation is shown by a condition brought to the attention of this author where a restaurant, paying a flat rate, is now able to pay the rental from the monthly proceeds of the restaurant "juke" box.

At this point it is opportune to note a few facts concerning "exclusive rights" in connection with airport operation and especially concessions.

Section 303 of the Civil Aeronautics Act of 1938 states that: "There shall be no exclusive right for the use of any landing area or air navigation facility upon which Federal funds have been expended." This has been interpreted by the Civil Aeronautics Administration to mean that no exclusive rights may be granted to any operations actually using the landing area of such an airport. These operations include all flying activities such as airplane rentals, instruction, airline use, and ability of management to attract and to "sell" customers. In turn, this ability of management depends upon the efficiency of facilities and employees both, "on the line", and in the office as salesmen. Maintaining this compound source of total income is, therefore, as much a problem of personnel as efficient facilities.

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Shown below is a table of sample percentages of gross at present in use.(2)

TABLE 9: TYPICAL RANGES IN PERCENTAGE-OF-GROSS-SALE RENTALS IN MERCANTILE LEASES. 1945.

Type of Concession	Range of rentals as a percentage of gross sales.
Restaurant	5 to 10
Cocktail lounge	8 to 10
Newsstands	7 to 15*
Barber and Beauty shops	10 to 20
Clothing establishments	5 to 10
Florists	8 to 15
Liquor store	5 to 9
Motion pictures	12½ to 25
Drug stores	4 to 10

* Figure from 1940

Source: From "Percentage lease table 1945" National Real Estate and Building Journal, February 1945, p. 29.

Recently, in connection with the National Airport Plan(3) (House Document No. 807) and the further expenditure of Federal funds on airports, more stringent interpretation of exclusive rights have been

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(1) Interview, February 5, 1947, with the Boston Representative of the Civil Aeronautics Administration.

(2) Bollinger, Passen, and McElfresh, Terminal Airport Financing and Management, p. 183.

(3) House Document No. 807, 78th Congress 2nd Session.

made. Section D of Appendix G of the "Sponsor's assurance Agreement (1) states that after the date of this agreement; it will not grant, exercise, or permit the exercise of any exclusive right to the airport for selling aircraft, aircraft parts or equipment, or for repairing aircraft and engines, or for carrying on other airport services or fixed base operations of an aeronautical nature." These restrictions are in addition to section 303 above, and do not replace or abrogate it.

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(1) Excerpts from the Federal Registra, dated January 9, 1947.

CHAPTER 4

RECORDS AND CONTROLS

One element, essential to successful management, is lacking at most airports today. This element is an adequate system of records and controls.(1) Careful planning and the setting up of standard operating procedures, well known to the ex-G.I. as the S.O.P., result in a competent, and functional, system. And system saves dollars in the operation of an airport - as in any other type of organization.

Not only is a careful record system necessary to the proper functioning of daily flight, and non-flying, activities, but it is also a "must" in preparing the numerous and exhaustive reports required by insurance companies, the Civil Aeronautics Administration, State, Federal, and municipal governments.

Looking first at existing and suggested methods of flight control, any system, of necessity, includes some method or form for recording reservations and airplane and pilot appointments. Many different forms have been designed for this purpose by petroleum products companies, and manufacturers of airplanes and airplane parts and equipment, and distributed as an advertising media to airport managers and operators. Although these forms vary in their presentation, basically, they are identical in content; dividing the working day into half hour periods and having a number of columns with captions such as, the NC number of the aircraft, the customers name, the instructor, (if any is assigned,) the date, and any

(1) Bollinger, Passen, and McElfresh, Terminal Airport Financing and Management. p. 225.

pertinent remarks. If the volume and rate of activity are comparatively low, such records may suffice. Another system in use at several of the airports selected as a sample, has proved to be more adequate and more efficient. It is a type of bulletin, or call, board. In other words, a large board accessible to the observation of all interested parties with permanent column captions and time stubs and removeable lettering and figures. This system prevents misplacement of the reservation sheet and the resultant confusion and customers ill will. Appointments may be entered on this board as they are made. Instructors may see at a glance their routine for the day. And the operator is informed at all times as to the availibility of his airplanes, whether they are in use, on the line, or in the shop.

Co-existent with the reservation form or board, an accurate record of all flights made by both customers and the company, must be kept. Commonly, this is referred to as the flight sheet. The form most often used is shown below.

FLIGHT SHEET(1)

XYZ Airways Inc.

Date Name	Airplane	Pilot	Nature of flight	Total time	Cash	on/acc.	Entered	Notes
John D.	Nc66-529	Tim M.	Charter	4:30	$50.		√	Motor rough

Figure 3.

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(1) Parker, C. H., "System Saves $$ at the Airport", *Aviation*, *Mr.'46*. p. 46-9.

This type of record, the flight sheet, on which all flight activity is recorded daily, serves as the main source from which the information necessary to many different required reports, and for airplane, instructor, and customers, log books is drawn. It is the only detailed record of this pertinent information and must be accurately and consistently kept.

As aide to recording on the flight sheet, several secondary forms, as well as some type of mechanical flight timer, have proved their worth. Two of these forms, shown below, are known as line release cards. These insure a means of liason between the office and line personnel and eliminate otherwise necessary, verbal, explanation. Also, they prevent unauthorized use of airplanes and, thereby, remove this responsibility, at least in part, from the line personnel. Furthermore, these cards may be later filed and serve as individual records for each student and renter pilot.

FLIGHT RELEASE(1)

Date-----   Card No.-----

Name ---------------
Ship --------------- NC# --------
Passengers ---------------
Local ---------------XC -----------
Dual ---------------
Time out --------------- time in -----
Total time --------------- approved -----

Please present to line man.

Figure 4.

(1) Parker, C. H., "System Saves $$ at the Airport", *Aviation*, Mr.'46. p.46-9.

CORSS COUNTRY RELEASE(1)

Date ----------
Card No. ------

Pilot ----------
Plane ---------- NC# ----------
From ---------- to ----------
Time departure ----------
Est. time of return ----------
Est. total flight time ----------
Time for ¾ gas consumption ----------
Gas at destination ----------
Checked: weather ---------- field condition -----
Approved for night flying ----------

Authorized by ---

Figure 5.

Since all flight charges are at present on a per hour basis, accurate time checking is extremely important. This is done in a number of ways by the different operators. The most common methods now used are: One, by recording directly on the flight sheet from observation; two, by checking, punching or stamping the line release cards; and three, by means of a mechanical recorder on the plane itself.

The added clerical work in connection with line release cards is generally deemed unnecessary when taking passengers on short pleasure, or sightseeing, flights. For this purpose, simple ride tickets are adequate. However, the ticket must include the plane NC number, the total time of flight,

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(1) Parker, C. H., "System Saves $$ at the Airport", Aviation, Mr.'46.p. 46-9.

and the charge to the customer. As in the case of the line release cards, this data is necessary for permanent record. (i.e. for entrance on the daily flight sheet.)

To prevent, as far as possible any legal complications that may arise from accidents resulting in either personal injury to a customer or damage to his or her airplane, all rental agreements should be in writing and a statement of liability limitations should be printed on all tickets and line release cards(1).

Adequate records for control of non-flying activities are as important as the controls discussed above in connection with flying activities.

A storage registration book is a well liked method of controling hangar rentals and tie-down charges. Such a book presents an overall picture and al the same time is an easy source of data for making out customer bills. It may also serve as the permanent record of such service.

The sale of petroleum products, and parts and accessories require less paper work. For average use, duplicate sales slips, as made up in booklet form or as fillers for the box type dispensers, are adequate. Special forms are provided by the gasoline companies for use with their particular charge cards. One of the duplicate slips should go to the customer for tax refund purposes. The other should be filed and turned over to the bookkeeper at the end of the day for entry in its particular account.

With only minor changes, standard automative practices are adaptable to the record and control needs of the airport maintenance and repair

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(1) Parker, C. H., "System Saves $$ at the Airport", Aviation, Mr.'46. p. 46-9.

shops(1). Routine inspection sheets, work orders, progress of work reports and stock room inventory cards are all standard forms. Adequate control here, therefore, depends on proper selection of methods to fit the individual need and careful, up to date maintenance, thereafter, of the record system chosen.

So far, in this chapter, the discussion has been centered on operational control and continual reference has been made to the effect that these records are the source from which the data is taken, necessary for permanent records and reports. There is, however, a very important intermediary step - the Airport system of accounts.

Several accounting systems have been designed specifically for airport use. However, as is shown in Table 10, only five of the twenty airports included in this survey make use of any of these systems designed for their benefit. The remainder have "their own system" which in most cases is often the inadequate result obtained by attempting to adapt standard business systems to the specialized needs of an airport.

"Probably the most important deficiency of existing airport records, from the standpoint of providing information necessary for financial management is in the classification of accounts(2). There are many ways of grouping accounts to present a complete functional breakdown of both income and expense accounts. However, a primary objective of classification should be the ability to compare income and expense for each major facility or operation.

(1) Parker, C. H., "System Saves $$ at the Airport", Aviation, Mr.'46. p. 46-9.

(2) Bollinger, Passen, and McElfresh, Terminal Airport Financing and Management. p. 228.

TABLE 10: AIRPORT ACCOUNTING SYSTEMS

TWENTY SELECTED AIRPORTS IN MASSACHUSETTS

January 30, 1947

Airport	System in Use
A	Own System
B	" "
C	" "
D	" "
E	" "
F	Patterson Taylor and Dennis "Airport Accounting System"
G	Aeronics Airport Accounting System
H	Own System
I	Ernst and Ernst Co. Airport Accounting System
J	Own System
K	" "
L	" "
M	" "
N	C.A.A. Suggested System for Airport Accounting
O	Own System
P	Aeronics Airport Accounting System
Q	Own System
R	" "
S	" "
T	" "

One method suggested is as follows(1). Airport revenue is divided into four main classes; (1) aviation revenues, (2) concessions revenues, (3) revenue from airport management sales and services, and (4) miscellaneous revenues.

Aviation revenues include hangar rentals, flight fees, ground rentals, and terminal building rentals. Sub accounts show the source of revenue under each of the main accounts. Concessions revenues is subdivided into accounts for each separate concession. The third main division, revenue from management sales and services, includes all airport-operated facilities or services with appropriate sub accounts. The miscellaneous revenues catagory may be used for any items not properly belonging in the first three groups.

Since the setting of rates and charges must be based essentially on cost plus a profit margin, a means of determining the costs attributable to particular services or facilities should be the aim of expense classification. It has been suggested(2) that expense accounts be classified first by function and then by object. Such a classification, should best provide the necessary information.

The nine functional groupings of expenses are as follows(2):

Maintenance and repair of:
- Field area
- Hangars
- Lighting and communication
- Seaplane walls, floats, and channels.
- Public areas (roads, streets, parks, and parking area)

(1) Joseph M. Cunningham for the Municipal Finance Affairs Association of the U.S. and Canada 1945, "Airport Accounts".

(2) Ibid.

Terminal buildings
Service equipment
Cost of Airport Management Sales and Services(1)
General and administrative expense.

The principal object accounts then maintained for each functional account are:(2)

Personal services
Supplies and naterials
Contractual services (electricity, insurance, etc.)
Others (professional fees, taxes, depreciations, interest, etc.)

"Sub accounts are set up under each of these principal object accounts for individual expense items. In determining costs of various revenue - producing activities, charges would be made to the nine functional catagories and the totals allocated on some appropriate basis to the productive or revenue - producing functions." (i.e., terminal building, landing area, hangars etc.)

How far the breakdown and allocation of expenses should go, depends on the size of the accounting department warranted by the size of the airport operations. Considerable clerical work and expense is necessary to the maintenance of a complete set of subsidiary records. Where airport operations are on a smaller scale, satisfactory results can be obtained more easily and for less expense by allocating direct expenses on the basis of estimation(3).

A second accounting system is that suggested by the Civil aeronautics Administration(4). This system has been designed to establish

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(1) Analysis accounts to be maintained for each airport - operated income-producing service.

(2) Joseph M. Cunningham for the Municipal finance Affairs Association of the U.S. and Canada 1945, "Airport Accounts".

(3) Bollinger, Passen, and McElfresh, Terminal Airport Financing and Management. p. 185.

(4) U.S. Department of Commerce, Civil Aeronautics Administration, Airport Management. p. 9.

the minimum information required to permit proper pricing for the use of facilities. The five schedules included in this system have been designed for use by both owner operator and municipal operators. One important change from normal accounting procedure has been made. It is the segregation of the usual ballance sheet items into three schedules. These schedules have furthermore treated the balance sheet as two parts.

Part one is made up of Schedules A and B. Schedule A includes all capital assets and total capital investment in the airport. Schedule B shows all capital liability and the source of funds from which the capital investment was made. The totals of these two schedules are always equal and present a total capital picture with which the profit and loss statement can be compared at any time.

Part two consists of Schedule C which "segregates into a separate statement all assets and liabilities which are constantly affected by operation of the airport and financial transactions so that the application of the net profit or loss is discernible at a glance."(1)

Schedule D, the income statement, consists of two groups of items. One, those items listed by gross totals; and two, those items shown at net amounts. The latter group represents operations which may be conducted on a concession basis.

Schedule E, operating expense, is broken down into salaries, rent, utilities, maintenance (hangars, landing areas, buildings, lighting and radio) depreciation, office and administration expense, taxes, insur-

(1) U. S. Department of Commerce, Civil Aeronautics Administration, _Airport Management_, p. 10.

ance, interest, and other expenses.(1)

Budgetary Planning and Business Forecasting

Only a minority of the airport managers with whom the topic was discussed during this survey make use of available information, other than that stemming from their own records, for the purpose of budgetary planning and business forecasting. These few have made use of such data as furnished by governmental reports, marketing surveys, outside indices, and aviation trade association statistics, to insure a flow of information to enable continuous forecasting. Such information together with a complete record of their own business, enables the airport managers to compare their own activities and volume with that of other concerns in the industry and with the business cycle as a whole. In this manner, it is possible for management to recognize and make allowances for seasonal variations and to gage the possible effect of cyclical fluctuations on the individual business.

New products, social, economic, and technical changes, population and income trends in the particular locality, and changing customer demands, all affect business activity at an airport. Management must obtain this information and use it to advantage if a system of budgetary control and sales forecasting is to be established and used effectively.

CHAPTER 9

AIRPORT FACILITIES

The selection, improvement, and maintenance of the landing area itself and the installation and operation of the various attendant air navigatorial aids, markers, lighting and radio controls et., are strictly a problem of airport engineering and, as such, are beyond the scope of this thesis. Quantities of material concerning all the problems of airport engineering have been published both by the Civil Aeronautics Administration and by private engineers and engineering concerns. Some engineering consultant firms specialize in this type of work. This is a fairly expensive approach. However, the Civil Aeronautics Administration as well as petroleum products companies and airplane and equipment manufactures are more than willing to lend able advice and assistance at no cost to the individual airport. This condition is natural since both the government and these other concerns have a vested interest in the success of airports and the future of aviation.

Constituting the second major item of capital expenditure are the remaining airport facilities other than the landing area. Particular attention should be paid by management both as to the type and extent required for efficient and economical production of service. Utility and a sufficient return on investment are the prime objectives and should govern management's decisions on selection and operation.

Administration or Terminal Building

Airport activity, regardless of the size of the airport, centers around the administration or terminal building. Consequently, serious

consideration must be given to the location, planning and arrangement of this facility.(1) Provisions for easy access and adequate parking areas are necessary not only for the public which will visit the airport as customers or spectators but also for the airport employees. Careful planning before construction will avoid serious parking problems that might develop as the volume of business increases. As far as possible, it is desirable to locate such a building centrally with regard to the aircraft movements on the airport. This reduces time lost in taxiing on the ground and facilitates loading, unloading, and handling of passengers and airplanes.

As is true in any business venture, the size and complexity of the airport terminal or office building is dictated by the size and multiplicity of the airport operations. Initially, in the case of a small airport, a lean-to addition on a hangar may suffice until business volume justifies a separate building.(2) When a separate building is constructed it should be planned as the first unit of a larger building where additional units may be added as soon as the traffic and use of the airport requires expansion of facilities.(3) Too often, such buildings have been built without provision for expansion thereby greatly increasing the cost of remodeling. The principles of design for expansion lie in the location of all expensive, functional, installations (toilets, stairs, and heating equipment etc.). These should be centrally located thereby continuing to serve both office and public space no matter how greatly these may be expanded.

(1) U. S. Department of Commerce, Civil Aeronautics Administration, _Airport Design_, April 1944.

(2) U. S. Department of Commerce, Civil Aeronautics Administration, _Small Airports_, September 1945.

(3) U. S. Department of Commerce, Civil Aeronautics Administration, _Airport Buildings_, January, 1946.

In addition to the offices, waiting room, rest rooms, class rooms, restaurant or snack bar, ticket counters and sales displays, whose size and presence is governed by the extent of the airport operations, two additional demands on building area have recently come to the attention of airport managers.(1) These are: a room to serve as a kind of club room for customers awaiting the use of an airplane and for use by flying club members etc., and; a room which may be used by visiting pilots or business executives as a conference room. The former room can include pin ball machines, a ping pong table, dart boards, and other indoor recreational facilities. This type of set-up tends to remove some of the confusion that normally exists if the main waiting room is used for this purpose. The presence of the latter type of room, of course, depends on the demand for such a facility. Several of the airport managers interviewed during this survey expressed belief in a future demand for a conference room and are planning for it. Four of the airports of the sample selected now have such a room set aside, complete with telephone, typewriter and stenographer. Five more plan to initiate this service in the near future.

Airport Hangars

At any airport which includes, or plans to include, airplane repair facilities, there is a definite need for two types of hangars.(2)

The first type, or maintenance, hangar is intended to house

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(1) Interviews, January 20, 1947, to February 30, 1947, with several airport managers.

(2) U. S. Department of Commerce, Civil Aeronautics Administration, Airport Buildings, p. 77.

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The first type, or maintenance, hangar is intended to house aircraft and engine repair of both customer and company-owned planes. Most of these planes are in the two to four place class and will be stored in multi-unit, or "T", hangars which make up the second hangar classification discussed later in this chapter. There are generally a few intermediate size planes at all small airports and correspondingly larger ones as the airport increases in size. These planes are too large to be stored in the usual unit hangars and, if they are to be hangared or worked on, the maintenance hangar must be used. Consequently, consideration must be given to this factor and the maintenance hangar designed to accomodate economically both large and small aircraft

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(1) Interviews, January 20, 1947, to February 30, 1947, with several airport managers.

(2) U. S. Department of Commerce, Civil Aeronautics Administration, *Airport Buildings*, p. 77.

It is apparent, then, that there is a need for both storage space and space for maintenance work. Portable work benches can be used in this service space to advantage. Electrical outlets for the connection of equipment, located at frequent intervals, are a definite convenience.

In addition to space for working on the airplane as a unit, separate space should be provided for shops such as; sheet metal and welding, wing and fuselage, dope room, instrument and radio, and material storage.(1) These shops should have direct access to the general repair space with a maximum of free opening to permit pulling the tail and fuselage into the shop when desired. However, these openings should be provided with fire doors protecting the hangar proper. In general, the amount of space necessary for these facilities has been estimated to be about one half the area of the space used for airplane repair (as distinguished from storage).(2)

(1) U. S. Department of Commerce, Civil Aero nautics Administration, Airport Buildings, p. 77.

(2) Ibid.

The second general type of hangar is that used for personal plane storage. Promotion of private flying and the sale of airplanes to individuals necessitates provision for plane storage of utmost "convenience at a reasonable rate."(1)

Future demands on size are difficult to anticipate at a time when the design of the personal plane itself is changing. The tendency appears to lie in the manufacture of two general classes: the smaller, or two to three place plane, and; the larger four to five place ship. The hangar unit, able to house the latter type, will therefore best fill the personal plane need.(1)

Among the airport managers and plane owners interviewed during this survey, the almost universal opinion, as expressed, favored the multi-unit, i.e., multiple "T" hangar. This type of hangar is made up of connected units. Since there is no need here for storage space or space for repair work, each unit is of minimum size required to house a single plane. Original cost of construction is, therefore, also at a minimum. No expansion problem exists. The only limitation as to the number of units which can be added is the ground area available.

In addition to economy of construction and ease of expansion, there is another important benefit in the use of a multiple unit hangar: the elimination of the airport managements liability for damage to a customers airplane caused by the man handling necessary to housing in a large hangar. The customer renting a unit in a multiple unit hangar may be given his own key and the unit thereby becomes his personal hangar.

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(1) U. S. Department of Commerce, Civil Aeronautics Administration, Airport Buildings, p. 81.

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(1) U. S. Department of Commerce, Civil Aeronautics Administration, Airport Buildings, p. 61.

He may receive aid from airport personnel in the mutual process of handling his ship in and out of the hangar unit, but the responsibility is his.

Fueling Facilities

As is shown below in Table 11, there are several types of fueling facilities now in use by the twenty airports selected for this survey.

TABLE 11: FUELING FACILITIES IN USE

TWENTY SELECTED AIRPORTS IN MASSACHUSETTS.

January 30, 1947

Airport	Type of Facility
A	Standing pump(1)
B	" "
C	" " plus barrels(2)
D	Fueling island(3)
E	" " with overhead hose
F	" "
G	" "
H	Standing pump and gasoline truck(4)
I	" " " " "
J	" " " " "
K	Fueling island
L	Standing pump
M	" " plus barrels
N	Fueling pits(5) and gasoline trucks
O	Standing pumps
P	Fueling pit
Q	" "
R	Standing pumps
S	" "
T	" "

The following definitions are of terms used in Table 11, and also in later discussions.

(1, 2, 3, 4, and 5) Explanation included in following discussion.

The Standing Pump - the conventional automobile service station type pump but with a longer length of hose.

Barrels - ordinary gasoline drums plus a hand pump.

The Fueling Island - design varies considerably in this case. However, in general, it consists of a concrete island either circular or multi-sided, six or eight inches high with a diameter of approximately twenty feet, a low pump in the center of the island and separate hose connections around the perimeter.

The Gasoline Truck - the same as that used for years by petroleum distributors. No change of design for particular use by airports.

The Fueling Pit - a tank, pump, and hose unit below the level of the ground, with a hinged top or cover flush with the ground level.

At the majority of those airports using standing pumps, barrels, or gasoline trucks, they are doing so not by choice but because the petroleum companies have been unable to meet the demand for equipment specially designed for airport use.

Opinion as to the type of equipment best suited for fueling at an airport is about equally divided between the island type of facility, and the mobile truck or trailer type.

The gasoline island has several advantages over other types of fueling facilities. With an island it is possible to fuel more than one plane at the same time. An incoming or outgoing pilot is directed to

taxi directly to the island if he desires gas. Once fueling is completed the arrangement of the island permits continued taxiing without manhandling. Since the fueling island is fixed in location, it won't become "bogged down" by mud conditions as do mobile units.

Certain disadvantages are also inherent in the fueling island. During peak periods of business, i.e. weekends, and holidays, an island may become overcrowded to the point that planes meet with damage from ground collisions. The average pilot doesn't like to be kept waiting. He will taxi his airplane to the island but if there are many ahead of him, he will leave it. It then becomes necessary for the attendant to return the plane to the parking line.

Mobile equipment eliminates congestion about a central point, i.e. the fueling island. Incoming planes may be sent directly to the parking line and thereby remove the necessity for manhandling. If the customer desires fuel, it is brought to the plane and not vice versa.

For this purpose the ordinary highway tank trucks are unsatisfactory for reasons of expense, adaptibility, and unreliability. Mobile unit trailers with independent pumping units to be towed by jeep or tractor may be one answer. Another type already proving its worth is the so called "gas porter."

Practically speaking, however, any type of mobile unit requires a hard surface on which to operate. Mud conditions destroy its mobility and consequently its usefulness.

Therefore, it may be said that the type of fueling equipment best suited for use at airports whose parking areas and taxi strips etc. are not paved, is the "fueling island." Conversely, for airports having

paved surfaces, the small, mobile type of equipment is the best answer to the problem of fueling facility.

The "fueling pit", defined above, is in use at a few airports. The main advantage of this type of facility is that it may be located, because of its flush construction, at any point on the parking area. Additional pits may be added as the need arises. However, where there are frequent conditions of ice, rain, snow, and mud, maintenance of fueling pits becomes a major problem. The Esso Company recently replaced six pump motors in one unit in four months.(1)

As guiding principles, safety, cost, and service to the customer, must be the determing factors in choosing the type of fueling installation to be used.(1)

The Airport Restaurant

Second only in importance to gasoline among the desires of visiting pilots landing at an airport, is the wish for something to eat and drink. Since the provision of service to the customer is a major source of airport income, the airport must provide what the customer wants. Very often he wants food and he wants it at the airport. Consequently, an airport restaurant, or at a minimum, a snack bar, is almost a necessity among sirport facilities.

Nine of the twenty airports included in this survey are equiped to serve food at the present time. The remainder all have plans for installing such service in the near future. The existing facilities encountered ranged from an elaborate set up, housed in a separate building, paved surfaces, the small, mobile type of equipment is the best answer to the problem of fueling facility.

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(1) Interview October 23, 1946, with Mr. R. F. Lybeck, Aviation Manager Esso Inc.

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Nine of the twenty airports included in this survey are equipped to serve food at the present time. The remainder all have plans for installing such service in the near future. The existing facilities encountered ranged from an elaborate set up, housed in a separate building, down to a make-shift, snack bar consisting of an electric hot plate and coffee maker. Size and completeness of service and equipment naturally depend upon the volume of business. However, standards of neatness, cleanliness, and good food cost little and add much to the overall reputation for good service developed by the individual airport.

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(1) Interview October 23, 1946, with Mr. R. F. Lybeck, Aviation Manager Esso Inc.

Most airport managers operate the restaurant on a concession basis. This relieves the airport of the necessity of entering the restaurant business directly. In one case, the restaurant concessionee is paying a flat rate. The majority pay a percent of gross, an arrangement which is fairer to both the airport management and the restaurant operator.

Other Airport Facilities

All but two of the twenty sample airports are equipped with a public telephone. The need for such service at an airport is as obvious as it is at any center of transportation and needs no explanation.

Ground transportation availability at an airport is a definite problem and various methods have been used in an attempt to solve it. Agreements with local bus companies, whose routes permit, to make scheduled stops at the airport have proved extremely valuable. Some few airports have an agreement with a taxi company whereby the company either keeps a cab at the airport during peak hours or has on call, giving the airport priority. Two of the airports surveyed maintain a car or jeep which is available for customer's use. No matter what kind of arrangement is made, it remains that the customer, particularly a visiting pilot, does want ground transportation, and it should be provided.

None of the airports in the sample provide over night facilities

at the airport proper. Eight of the twenty have agreements with local establishments and provide accomodations upon receipt of sufficient notice. Many, however, are planning to include cabins or similar arrangements as soon as possible in an effort to maintain complete service to their visiting customers.

CHAPTER 6

THE AIRPORT AND THE COMMUNITY

A constant source of minor irritation to the operators of existing airports and of major importance in the locating of a new field is a condition of relationship best described as the fight for "public acceptance." By "public acceptance", is meant the willingness of surrounding property owners to accept the presence of, and cooperate with, the airport.

A wide range in this matter of public acceptance was reported by the airport managers questioned during this survey. The majority stated that they were experiencing a high degree of cooperation from both the local government and the surrounding property owners. Others, while they have met with no expressed opposition, feel that existing relationships still leave much to be desired. A few have met with open hostility.

The opposition generally is based on the fear that the presence of an airport and flying activity may prove to be a liability to surrounding residential areas and consequently detract from real estate values. To support this opinion, they site objectional noise and possible danger to life and property from airplane accidents in the vicinity of the airport. However, statistics gathered by the Safety Bureau of the Civil Aeronautics Board for the period 1940-43 show that there is no evidence that a building situated near an airport is in any greater danger than one located far from such an activity.[1]

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[1] U. S. Department of Commerce, Civil Aeronautics Administration, Airport Planning for Urban Areas, p. 7.

CHAPTER 5

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Where noise is concerned, residents in the area immediate to the airport do have a legitimate basis for complaint. "The noise made by airplanes flying over residences has created resentment in property owners against location of fields near their homes. This is a problem definitely on the drawing board of the engineer."(1) Some progress has already been made and the near future should bring a solution through engineering design.

Contrary to the adverse effect upon real estate values feared by some land owners, the presence of an airport can exert a beneficial effect upon land values. As the airport grows in importance as a transportation center, the surrounding land gradually increases in value as an aterial location for many types of businesses. These may have a partial connection with the airport itself or may be separate retail and service establishments. The airport may well become a shopping center as well as a center of transportation.

As far as the municipality as a whole is concerned, it has been stated that many industries are interested in locating their plants where air transportation is available for their executives and salesmen.(2) An airport can be an important connecting link in the channel of trade. Also, it will permit extended and easier commuting, offer rapid access and egress to visitors, provide sports enthusiasts with easy travel facilities, and give quicker transportation to professional and business men.(2)

To make the public conscious of the benefits of an airport,

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To make the public conscious of the benefits of an airport, to build up public acceptance and insure cooperation, it sometimes is necessary for the airport management to "educate" the public. Where this has been necessary, the airport managers interviewed are of accord that the place to start is with the local chamber of commerce or, if such does not exist, the board of selectmen or town fathers. Once their cooperation is obtained, and the interests of the airport adequately represented, the problem of public acceptance, if not removed altogether, is at least greatly reduced.

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(2) *Ibid*, p. 139.

Many benefits accrue to the airport from the cooperation of such local organizations and municipal officers. "Chambers of commerce and civic clubs are ideal agencies for arousing and maintaining interest in all aviation activities."(1) Through them, the airport manager is able to develope community "airmindedness" and prestige for his airport. Thus, many of the benefits mentioned above, are indirect in nature, the result of the airport becoming recognized as an integral part of, and an asset to, the life of the community.

Zoning

One of the greatest problems concerning operating safety at an airport is that of proper zoning. Obstructions about an airport (high power, and telephone lines) must be removed, and the necessary approach areas safeguarded against future hazards by competent airport area zoning.

Of the twenty airport managers interviewed, only one reported

(1) U. S. Department of Commerce, Civil Aeronautics Administration, Airport Management, p. 5.

the existence of a specific local ordinance for the protection of the airport through zoning. Thirteen, however, although no such zoning ordinance has been enacted, (in several cases such legislation is pending) are presently protected by "local agreement." Such a situation is dangerous as its existence depends on the continued favor of local officials.

Without exception, the managers of the airports included in this survey believe in the necessity of zoning by enacted legislation.

Among the twenty-seven states(1) which have enacted state airport zoning legislation is Massachusetts. "L. 1941, C. 537 - Authorizes any city except Boston (L. 1939, C. 13 covers Boston) and any town, with the approval of the Massachusetts Aeronautics Commission, to adopt airport zoning regulations for the protection of any publicly owned airport, similar to the C.A.A. - NIMLO model airport zoning act."(2)

This model airport zoning act drawn up on November 7, 1944 by the Civil Aeronautics Administration, U. S. Department of Commerce and the National Institute of Municipal Law Officers suggests the following legislation:

"An act to empower municipalities and other political subdivisions to promulgate, administer, and enforce airport zoning regulations limiting the height of structures and objects of natural growth, and otherwise regulating the use of property , in the vicinity of airports, and to acquire, by purchase, grant or condemnation, air rights and other interests in land; to provide penalties and remedies for violations of

(1) As of 1944.
(2) Civil Aeronautics Administration, Airport Service, August 1944.

this act or of any ordinance or regulation made under the authority conferred herein; and for other purposes."(1)

The decision in the case of "United Airports Company of California, Ltd. vs. Himman et al" appears to be a very strong authority for the proposition that airport zoning may be legally enforced by police power. In this case, a privately owned airport asked for an injunction to prevent the errection of high poles on adjacent property. The court issued the injunction basing its decisions on the ground that obstructions to air navigation at this airport would be both a private and a public muisance.

It is highly desirable to base airport zoning upon a comprehensive city or county plan, to incorporate the airport zoning regulations in the community zoning regulations. This is, however, not necessary to the constitutionality of airport zoning since such zoning may be valid even if there is no basic community plan covering the airport.(2)

In general, zoning requirements in the airport area are best fulfilled by a specific ordinance guiding commercial and residential development along lines which are compatible with safe airport operations.

Public Relations

No matter how large or small the airport may be, it cannot be given too much good publicity. Advertising is therefore one of the important jobs of airport management.

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(1) U. S. Department of Commerce, Civil Aeronautics Administration, Model State Airport Zoning Act, November 7, 1941.

(2) John M. Hunter, "The Relations of Airport Zoning to Community Planning and Zoning," April 8, 1940, paper.

Both the amount and type of advertising conducted by the twenty airports in this survey varied widely. At the nine airports for which figures were available the yearly advertising expenditure ranged from three hundred and sixty to four thousand dollars per year.

Although, in no case had an actual survey been conducted to determine the value of the advertising techniques employed, estimations concerning the worth of different advertising media were as follows.

Bill-board advertising, particularly at the entrance to a field not easily seen from a main highway or located "off the beaten track", was considered by several airport managers as a "must."

Advertising in local newspapers was rated highest in direct effect upon volume of student instruction and recreational and charter flying. The direct value of magazine advertisements was considered hard to even estimate. However, the majority of airport managers use this media quite extensively.

Circulars to a general mailing list including both old and prospective customers, and other airports, are being increasingly used and looked upon with favor.

Several airport managers claim success with radio advertising. In two cases, this has consisted of a short daily or semi-weekly aviation news brief, the airport manager furnishing aviation news of local interest and in return receiving a "plug" from the newscaster.

Publicity stunts such as air races, air meets, acrobatic exhibitions, arial santa clauses, etc., are another form of advertising in use. Here again, the direct effect produced is almost incapable of appraisal.

In general, airport advertising is still in a very experimental stage. Besides the types of advertising mentioned above, airport managers are prone to emphasize the value of favorable word-of-mouth advertising. This depends upon satisfied customers. Consequently, the question of good service at the airport must again be considered. This time with regard to its advertising value to the airport. The questions which must be decided by the individual airport manager are: whether the future beneficial effects of increased present service warrant the additional expense incurred; or if, when in the future he may find it necessary to cut costs, would the effect upon customers of reduced service (the result of cutting personnel costs) be greater in comparison than the present benefit of increased service?

CHAPTER 7

SUMMARY AND CONCLUSION

To make the statement that airports today are a glaring example of inefficiency and bad management would be an exaggeration. On the contrary, with but one exception, the twenty airports included in this survey are as well managed and efficiently operated as any other business of comparable size. The degree of efficiency naturally varies between individual airports, being dependent upon the ability and experience of management. Management policies differ widely as to the problems with which each airport manager is faced. As a young industry, the airport must still rely upon the process of trial and error. A particular technique, successful at one airport, often proves to be of little or no value at another.

The primary fault of civil aviation at the present time lies not so much with managerial efficiency as with the materiel with which it deals. It is the basic design of the airplane and not poor management that is the cause of most of the trouble that is being experienced by small airports.

The utility of the personal airplane of today is restricted by both the size of the area necessary for landing, taking off, storage, and by the high degree of ability and experience demanded for safe flight. The airplane of tomorrow must be capable of operating from a space small enough to be practically located in the heart of a town or city. It must be adapted for storage in a much smaller space than is now possible. It must also be simple and safe to fly. So simple and so safe that, figuratively speaking, all the pilot has to do, if lost or faced with bad weather

or mechanical failure, is flip a switch on the dash-board to bring the airplane to the ground in one piece and with no injury to himself.

The present high cost of the airplane continues to keep private flying in the catagory of a "rich man's sport". The manufacturers state that they cannot decrease manufacturing costs and thereby unit prices until they achieve volume production. Volume production depends upon sales volume. And aircraft dealers and distributors claim that greatly increased sales are impossible at the present price levels. Consequently, the problems of manufacturing and marketing have become a vicious circle necessitating a radical change in the product itself.

Therefore, until such time as the cost of the airplane is brought within reason (and the reach of the intended consumer's pocketbook) and its utility and safety measurably increased, the small airport will be forced to continue to operate with a very narrow, and often non-existent, margin of profit.

APPENDIX A

STORAGE CHARGES

AIRCRAFT STORAGE RATES

SINGLE ENGINE

Aircraft to 1500 lbs.	$ 1.00 per night	$ 25.00 per month
1501 " 3000 "	1.50 " "	35.00 " "
3001 " 4500 "	2.00 " "	45.00 " "
4501 " 10000 "	3.00 " "	65.00 " "

MULTI ENGINE

Aircraft to 6000lbs.	3.50 per night	90.00 per month
6001 11000 "	4.00 " "	125.00 " "
Over 11000 "	8.00 " "	200.00 " "

AIR TIE-DOWN RATES

Aircraft to 1500 lbs.	.50 per night	10.00 per month
" 3000 "	.75 " "	15.00 " "
" 4500 "	1.00 " "	20.00 " "
Aircraft to 10000 lbs.	1.25 per night	27.50 per month
" over 10000 "	2.25 " "	50.00 " "

ENGINE WARM-UP

50¢ per unit

Monthly rates become effective on date application is accepted, and said application must be accompanied by full month advance payment.

ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE

TIE DOWN RATES

CLASS A: 1 - 1800 pounds Gross Weight

$9.00 month, $3.00 week, $.75 day

Piper J3, Piper J4, Piper J5, Aeronca 50L, Aeronca 65 LB, Taylorcraft L2M, Luscombe 8, Luscombe 4, Stinson Voyager, Bellanca Cruisair, Ercoupe, Piper PA12, Cessna 120 & 140, Swift.

CLASS B: 1800-3000 pounds Gross Weight

$12.50 month, $4.00 week, $1.00 day

Cessna C165, Fairchild PT19, Waco SB, Fairchild 24, Beechcraft E17B, Seabee, Stinson 150

CLASS C: 3000-4300 pounds Gross Weight

$15.00 month, $5.00 week, $1.25 day

Waco UPF7, Stearman, Stinson SR9, Beechcraft D17S, Howard DGA, Vultee BT13, Stinson SR10

CLASS D: 4300-6000 pounds Gross Weight

$25.00 month, $8.50 week, $1.75 day

Grumman G44, North American AT6, Cessna UC78, Cessna T50

CLASS E: 6000-10,000 pounds Gross Weight

$30.00 month, $10.00 week $2.00 day

Beechcraft 18S, Grumman C21

CLASS F: Lockheed

$35.00 month, $12.50 week, $2.50 day

CLASS G: Douglas

$50.00 month, $15.00 week, $3.00 day

APPENDIX B

ACCOUNTING SYSTEM SUGGESTED

BY THE CIVIL AERONAUTICS ADMINISTRATION

SCHEDULE A--CAPITAL INVESTMENT

1. Land--purchase price; or estimated value of land donated __________
2. Landing field--cost of improvements, such as grading, drainage, runways, taxiways, and apron ------------ __________
3. Terminal, or administration building ------------------ __________
4. Hangars -- __________
5. Other buildings ------------------------------------- __________
6. Lighting systems ----------------------------------- __________
7. Radio systems --------------------------------------- __________
8. Equipment:
    - (a) Crash, fire, and safety equipment --- __________
    - (b) Field maintenance equipment --------- __________
    - (c) Shop equipment --------------------- __________
    - (d) Office equipment ------------------- __________
9. Other capital assets (describe) ----------------------- __________
10. Parks, and parking areas ------------------------------ __________

SCHEDULE B--SOURCE OF INVESTED CAPITAL

1. All capital financial obligations, such as bond issues, notes, debentures, stock and other securities: (describe below).
    - Total original amount ------------------------------ __________
        - Amount previously retired -------- __________
        - Balance outstanding -------------- __________
2. Any capital investment from municipal cash accounts, tax funds, etc., which was used to pay the original cost of construction or improvements -------------- __________
3. Governmental financial capital aid:
    - Federal -------------------------------- __________
    - State ---------------------------------- __________
    - County --------------------------------- __________
    - City ----------------------------------- __________
    - Other governmental body --------------- __________
4. Private gifts or donations ---------------------------- __________
5. Revenue used for capital improvements ----------------- __________
6. Other --- __________
    - Total Invested Capital ----------------------------- __________

Describe bond issues, or other securities listed under item 1, above:
Rate of retirement for balance outstanding

SCHEDULE C--CUMULATIVE CAPITAL OPERATION

		Debit	Credit
1. Securities retired		______	
2. Additional cash capital advanced from general municipal funds, tax funds, or other sources, which was used to retire securities or for other similar purposes			______
3. Current cash balance in security retirement fund, or "slush fund," if any such fund has been created specifically for this project		______	
4. Current cash balance in cash operating account, if any such account has been created specifically for this project		______	
5. Cash advanced from general municipal funds, or other sources, for operating purposes			______
6. Reserves for depreciation:			
Buildings	______		
Improvements	______		
Equipment	______		______
7. Revenue distributed to capital improvements, (Same as Schedule B, item 5.)		______	
8. Revenue realized in previous years and distributed to purposes other than capital improvements or operating expenses or airport. (Total cumulative net revenue taken from project and distributed to owner and/or operator.		______	
9. Current outstanding assets and liabilities: Assets such as accounts and notes receivable. prepaid interest, insurance and taxes; liabilities of a corresponding nature. (Show details on separate schedule.)		______	______
10. Total net cumulative operating gain or loss		______	______
TOTALS		______	______

SCHEDULE D--INCOME

	(Gross)
1. Landing fees	______
2. Fees from landing light service	______
3. Rents from hangars and storage	______
4. Rents from terminal building, and other space	______
	(Net)
5. Sale of aviation gas and oil	______
6. Sale of aircraft and parts	______
7. Aviation training schools	______
8. Local passenger flights	______
9. Charter service	______
10. Concession of non-aviation nature (detail on separate schedule)	______
11. Other income (detail)	______
Total Income	______

SCHEDULE E--OPERATING EXPENSE

Salaries:			
Administrative			----------
Operative			----------
Maintenance (memorandum only)			----------
TOTAL SALARIES (EXCEPT MAINTENANCE)			----------
Rent			----------
Power, light, heat and water (net)			----------
	Salaries	Other	
Maintenance of landing field: (including field, runways, taxiways and apron)	----------	-------	----------
Maintenance of hangars	----------	-------	----------
Maintenance of administration building and other buildings	----------	-------	----------
Maintenance of field lighting	----------	-------	----------
Maintenance of radio facilities	----------	-------	----------
TOTAL MAINTENANCE	----------	-------	----------
Depreciation expense:			
Buildings		-------	
Improvements		-------	
Equipment		-------	----------
Miscellaneous office and administrative expense			----------
Taxes			----------
Insurance			----------
Interest			----------
Other expense			----------
TOTAL OPERATING EXPENSE			----------

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